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DO SPRUCE GROUSE EXHIBIT BEHAVIORAL POLYMORPHISM DURING DISPERSAL?

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Perhaps the title of this paper should read: DO SPRUCE GROUSE EXHIBIT BEHAVIORAL POLYMORPHISM ASSOCIATED WITH MIGRATION AND/OR DISPERSAL? Like many here, I analyzed some of the data after I had submitted an abstract and title.

This paper will attempt to examine potential behavioral differences associated with the dispersal and/or migration of female spruce grouse. In this paper *dispersal* will refer to the movement of a bird from its first winter range to its first breeding range. *Migration* will refer to the repeated movements between winter and breeding ranges. The dispersal movement made by a young bird in its first winter is generally repeated in subsequent years as a migration movement. I plan to examine the null hypothesis that long and short dispersers and migrants are not different with respect to various behaviors. The existance of differences is an important "first step" if the ecological and evolutionary consequences of these movements are to be determined.

The subject of this talk is shown here...a female spruce grouse. My study area is 60km southwest of Calgary, Alberta and is shown by the star. It is located at the R. B. Miller Biological Station adjacent to the Sheep River west of Turner Valley. Spruce grouse have been studied here for esentially 20 continuous years. Although located in the foot hill region, it is surounded by a variety of topography. Some of that variability is shown here.

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The main region of study is located in predominantly lodgepole pine habitat, although areas of spruce, poplar, and willow are common. Most birds were banded, as is this male, and all birds in this study were radioed. Radioes permited birds to be tracked at any time, and followed for long distances. Radioed birds were tracked in 1974-75, and 1982-83.

The first objective of this study is to examine the similarity between dispersal and migration. Male distances are shown on top as a reference. Dispersal distances are in black, the vertical axis is the number of birds, and the horizontal axis is the distance. As you can see, there is more variability in distance for females than males. Only one male was observed at more than 2000m, while females commonly moved that far. When just females are considered, dispersal and migration movements have similar and highly skewed distributions. When statistically compared, they were not significantly different, despite the apparent difference in medians. The movement categories are shown on the left, the median distances are the upper center, and the probability is the upper right. 2000m was used as an arbitrary division point for long and short distance movers. It provided an additional comparison. Despite the similarity between dispersers and migrants as shown here, this study will only look at migrants because of the larger sample size.

So, for those of you still paying attention, this study will only examine the differences directly relating to migration movements. One of the reasons for keeping dispersers separate from migrants is the significant difference in dates of movement. The first two categories represent spring movements while the last 2 are fall movements. I will use the median migration dates later when comparing long and short distance categories.

The following points will be examined for short and long migrants using 2000m as the division:

- Variability of migration timing
- Reverse migratory movements
- Flock composition
- Flock stability

The variability of timing and reverse migratory movements, points 1 and 2, were only determined for birds moving more than 400m. The 2000m division, split the birds into 2 equal parts, short and long migrants.

The first point, or "variability of migration timing", indicated that short migrants were significantly more variable in dates of movement than were long migrants. This was despite the almost equal median dates for each category.

The second point, "reverse migratory movements", esentially reinforces the same theme. What I mean by reverse migratory trips, are movements that are repeated within one season. For 15 reverse migratory movements, only one was observed for long migrants. Even that bird was marginal, with a 2100m migration distance.

"Flock composition", or point 3, has been examined in past research. Juveniles have been suggested to have the highest tendency to flock while adult females are second in flocking frequency. The examination of flocking differences, showed interesting differences. These are the categories of migrants and these are various flocking categories with their subsequent probabilities. The first division indicates that long migrants flock more frequently than short migrants. A more detailed analysis shows that the difference is not due to non-female flocks, but to female flocks.

Further evaluation of the female flocks provides additional insight. This table is organized the same way as the previous slide. Both categories do not differ with respect to long migrants, but long migrants flock with short migrants significantly more than do other short migrants. These results may suggest that short migrants are avoiding each other.

Examination of "flock stability", or point 4, re-emphisizes a similar point. Flock composition is shown on the left with duration and sample size in the columns to the right. Not only are flocks between more than one short migrant uncommon, but they are short lasting. There were only two flocks between short migrants and they lasted a maximum of 3 days, while long migrants were seen together up to 15 days.

In summary long and short migrants apparently differ in all 4 of these categories. Careful observation of the movements of long migrants has shown that they tend to regularly move about 1500m a day in a constant direction during migration, which is not suggestive of an environmental and/or socially caused movement, but of a "pre disposed" urge. On the other hand, short migrants seem to be avoiding other females, especially short migrants, but not avoiding flocking in general. Their behavior may be suggestive of winter spacing behavior possibly leading to their short movements. Because of the similarity between dispersal and migration, examination of dispersing birds on their first movement, may provide further insight. Although this data does not determine what the different influences on migration and/or dispersal movements are, it does show that long and short migrants differ with aspects of behavior other than distance.

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